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ABSTRACT

This analysis of a research and development program conducted in the Brighton Polytechnic Department of Librarianship between 1975 and 1980 to explore the use of computer-related education in all areas of the librarianship curriculum focuses on the use of computer-based teaching packages integrated into the core curriculum, the nature and content of preliminary course units required to support computer-related core curriculum teaching, the development of a series of objectives for such a program, and the identification of factors influencing success in obtaining these objectives. Problems encountered are discussed, including the need to strike a balance between traditional course content and content reflecting environmental changes, and principles formulated are outlined. Recent advances in technology and the extent of theoretical knowledge and practical expertise now required by professionals are discussed in relation to the findings of this analysis. Seven references are listed. (Author/LMM)

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COMPUTER-RELATED PRE-PROFESSIONAL EDUCATION FOR LIBRARY AND INFORMATION WORK

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Keywords: *Librarianship, Curriculum Development, Education, Teaching Packages, Computer Studies.*

Abstract: The paper presents an analysis of a research and development programme carried out between 1975 and 1980 into computer-related education in all areas of the librarianship curriculum, with emphasis on the use of computer-based teaching packages integrated into the core curriculum, and on the nature and content of preliminary course units required to support computer-related core curriculum teaching. Problems encountered and principles formulated are outlined. Recent advances in technology and the extent of theoretical knowledge and practical expertise now required by professionals are discussed in relation to the findings of this analysis.

1 INTRODUCTION

The penetration of online computer-aided activities in all areas of library and information work and in all types and sizes of information units necessitates revised consideration of the extent and nature of preparation required in pre-professional education. Schools of Librarianship and Information Science have been responding in different ways to this need, and as yet there is no consensus on how to teach computing and computer applications most effectively, and how to relate this teaching to the librarianship/information science curriculum. Traditionally, British Schools have concentrated on providing an all-round education for budding professionals; one which would enable a newly-qualified librarian to enter any area of information work, and to develop expertise later as interest and opportunity allowed. Options are offered in most courses, but these are seen more as a means of enriching students' educational experience through the provision of opportunities for depth study and individual enterprise, than as career-orientated specialities.

Historically then, it is not surprising that in most cases computer studies appeared first as optional modules, taught on a rather superficial level. Eyre, in his analysis of the structure and content of computer courses in British and American schools, noted the wide difference in the treatment of the topic, the amount of detail included, and in the fact that aspects of computer teaching were dispersed differently in different Schools. (Ref.1.). The average 'Computer Appreciation' course was a one-term (14-hour) unit; while the teaching of 'Library Automation' he found to be considered on both sides of the Atlantic one of the most unsatisfactory parts of the curriculum.

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This paper describes some of the results of a study, based on a five-year programme of research and development carried out in the Brighton Polytechnic Department of Librarianship between 1975 and 1980, into computer-related education in all areas of the librarianship curriculum (Ref.2). The study aimed to probe the place and nature of the teaching of computing and computer-related applications in education for librarianship; to develop a series of objectives for such a teaching programme, and to discover the factors influencing success in attaining these objectives.

2 INITIAL PROBLEMS

The first problem is common to all areas of the curriculum. It is that a balance must be struck between traditional course content and content reflecting changes in the environment. All professional education must recognise the importance of relating curricula to professional needs, thus the diversity of demands upon the newly-qualified professional must also be taken into consideration. Courses must equip students to cope with the demands of their first jobs, as well as providing them with the educational background necessary for future development and change. While some will enter large and well-established libraries providing in-service training, others will have to be able to stand alone in the one-person information unit. An adequate base must be provided for all situations.

In computing studies, an additional problem arises from the fact that the type of student attracted to librarianship tends to be humanities-orientated, literate rather than numerate, and unwilling to grapple with technical, mechanical and mathematical topics. These attitudes were expected to be carried over into computer-related education, and both experience and research elsewhere have confirmed the existence of the resultant psychological barrier. The findings of the author upheld this assumption, as attitude testing of cohorts entering pre-professional education from 1977 to 1982 disclosed a persistently high level of students anticipating 'difficulty' in learning about computers. This was in spite of increasing familiarity with computers and allied technology during the same period, which was reflected in a notable fall in apprehension about the actual use of computers during the course. That such students are in fact capable of absorbing such studies has been established in research by Oulton and Wood, and confirmed by the results of the study described here (Ref. 3.). Moreover, the author's findings indicated that students enter pre-professional education with attitudes receptive to computer studies - 'difficult' and 'useful' being two of the most common attitudes found.

The questions posed to educationalists therefore, are how extensive the content of computer studies should be; how these studies should be related to other areas of the librarianship and information science curriculum; and what teaching methods should be adopted to make the studies most effective.

3 INTEGRATION OF COMPUTER STUDIES

Integration of all but the minimum basic studies appeared to the author to be the most desirable method of teaching computing in pre-professional education. As noted by Needham in a general comment on expansion of librarianship curricula - "the tendency of expansion is towards dilution unless the additives are fruitfully integrated. If integrated, the contrary is the case: then they yield far more than their worth, the whole being greater than the sum of the parts" (Ref. 4.). Furthermore, integration within the general curriculum would appear to be an aid to acceptance, as successful teaching requires the stimulus of student motivation. Sheldrake maintained in his study of two innovative courses

in which students were introduced to subjects that had usually been regarded as outside the accepted course content central to their professional training, that such courses might be acceptable if they could be shown to have relevance to the rest of the student's studies in the department, or his work when he left (Ref. 5.).

The study therefore started from the hypothesis that the teaching of computing integrated into librarianship studies course units was more effective than separate Computer Applications Courses (the norm at the time the research programme started), as this structure demonstrates the close relationship of computer studies with all areas of librarianship, thus enabling students to perceive their relevance, increasing student motivation. Integration also makes it possible to increase the time spent in exploring computer applications, thus increasing familiarity with the computer, which in turn increases students' confidence and decreases the psychological barriers to effective learning.

Enjoyment was also hypothesised to be a factor in motivation, and testing done in the study established links between enjoyment and the achievement of stated objectives for individual course units. Taylor maintained that if something students enjoy can be introduced relevantly into learning, resistance is reduced and efficiency is likely to be maximised (Ref.6.). In this study, where these links did not occur, and objectives were still realised, it appeared that perceived relevance was the overriding factor - in other words that relevance was the more highly motivating factor.

4 FOUNDATION COMPUTER STUDIES

Work done during the research programme also covered the nature and content of preliminary course units on computers and computing required to support computer-related core curriculum teaching. There appears to have been three stages in this type of course unit. The "black box" approach found by Eyre, or what Makkar has called the Computer Awareness stage, defined as "the possession of sufficient knowledge to enable inferences, general and social, to be made on the basis of what is seen and heard about computers" (Ref.7.). This covers high level concepts, such as that computers can process information fast and maintain large files. The Computer Appreciation stage extended this to provide more information about computers as such. Just how much information should be given has been the major area of difficulty. The generally agreed motives here relate to breaking the barriers of unfamiliarity in understanding, use and terminology.

Introductory Computer Studies, as defined in the study represents the third stage, combining the objectives of both early stages, and adding sufficient knowledge about such topics as computer hardware and software, data input, computer output, file structure, systems analysis and design, to form a basis for informed studies of library applications and for further specialised computing studies. The course unit developed was slanted towards data processing rather than the number-crunching capabilities of the computer, and couched as far as possible in terms acceptable to the non-numerate majority. Any study of library applications as such were also ruled out, as it was felt that there would be insufficient time to cover them to any meaningful extent.

The inclusion of programming in such courses has been and still is a matter of controversy. It was proved to be a stumbling block for the majority of students during the research programme, and there was insufficient time for any worthwhile knowledge to be gained by the few who found it stimulating. Consequently, the attempt to teach a programming language was abandoned, with self-instructional materials being made

available to interested students.

The outcome of the work was a course unit developed as a result of trial and error, observation and recorded comment, which performed reasonably adequately as foundation for the computer-related activities in which cohorts later engaged. It was not subjected to any rigorous testing, and no claims are made for it as a definitive syllabus. As a result of testing related to the teaching packages discussed below, the practical element of the course unit was totally integrated and further extended to equal the time spent on theoretical study. Tests showed the practical approach to be more acceptable than the purely theoretical, and student comment indicated that this work aided the understanding of theory.

Staffing has been another area of controversy. The options open to Schools are the use of outside specialists (service teaching); the appointment of computer specialists to the staff of the School; the training or retraining of librarianship lecturers to equip them for computer studies teaching. All methods have been used, and all have supporters and critics. The first option was used in the work under discussion, and was found successful largely because of the close and stable relationship between the specialist lecturer and the staff of the School. The great advantage of this option is the continual involvement of the supply teacher in advancing computer technology. Experience in other Departments of the institution showed that fossilisation of outlook and information set in rapidly when the third option was used. The second option might well suffer similar problems once the specialist was cut off from continuous contact with his peers. In an area of very rapid change, this could be the deciding factor. As staff establishments contract, the advantages resulting from the first option become more pronounced, while if studies of computer applications are later dispersed throughout the curriculum, the availability of expert advice from such a person is an added bonus and such contacts help to increase the links between the supply teacher and librarianship studies as a whole.

5 OPTIONAL ADVANCED COMPUTER STUDIES

The clarification of the aims and limitations of foundation computer studies which emerged from this study, and experience gained in computing work associated with the core librarianship papers, resulted in the design of an advanced option syllabus. The decision to introduce this option was influenced by the lack of opportunities for specialisation at undergraduate level which Eyre had found in British Schools, compared with opportunities commonly available to North American students (Ref.1.). The option was intended to produce graduates who would later be able to take responsibility within automated areas of library systems, and be capable of resolving problems that might arise, planning developments, and advising on hardware and software aspects of computer use, as suggested by Eyre. Following the philosophy adopted by the author, namely the association of computer studies with the whole field of core librarianship studies, the syllabus was designed to extend and deepen understanding of the computer applications studies in the core librarianship papers, covering related areas alongside their treatment in the core papers. It also included studies of the computer industry, computer systems, and associated technology of relevance to librarians, for example, telecommunications. In line with the conclusion that any formal teaching of programming should be extensive enough to be worthwhile, the option contained a strong element of programming in a language suitable for library needs. Details of the syllabus are given elsewhere (Ref.2.).

6 COMPUTER-BASED TEACHING PACKAGES

In considering what teaching methods should be employed in this area, the use of computer-based teaching packages presented an obvious solution. Education for librarianship has traditionally been a blend of the practical and the theoretical, and to understand the nature of the computer and its role in information work without some practical experience of its use is as impossible as it is to understand cataloguing standards and the role of the catalogue without undertaking any practical cataloguing. These packages also appeared to present an ideal method of blending librarianship teaching with computer teaching, and helping to overcome the psychological barriers to acceptability noted above. Consequently, the second hypothesis upon which the study was based, was that the use of computer-based packages increases teaching effectiveness by making computer studies more understandable, and by increasing student motivation through enjoyment and the perception of relevance to librarianship. This was upheld through testing computer-based teaching packages associated with the foundation computer studies described above.

The general aims of packages programmes were established in terms of curriculum development as primarily to support the teaching of computing itself in the early stage of foundation computer studies, using packages with librarianship content to provide the necessary stimulus of perceived relevance; and as primarily to support the teaching of the appropriate core librarianship subject in later units, with the secondary objective of extending and reinforcing computing knowledge and expertise.

Each package had a set of specific objectives related to the course unit it was designed to support, so that formative and summative evaluation could be used to discover the factors which influenced effectiveness. As far as individual packages were concerned, the design of the package in relation to clearly defined teaching objectives was shown to be the crucial factor. Packages which were the by-product of some other exercise - such as the University of Lancaster Management Games - were shown to be less successful than packages specifically developed with teaching objectives in mind. Packages requiring student involvement appeared to be more successful than simulations - although simulations were shown to play an important role in a programme of packages. The extent to which students were able to work individually and achieve satisfying results influenced effectiveness. A positive practical outcome, such as the production of a search bibliography for a real client, or the production of an individual catalogue from the student's own bibliographical data, was shown to stimulate effort and heighten the achievement of package objectives.

Analysis of the effectiveness of programmes of packages associated with different core curriculum areas in relation to implementation methods showed that the closer the integration with the core studies, the more successful the packages were in attaining their objectives. This was found to be the most important single factor in effectiveness. A sympathetic educational environment was shown to be another important factor. As computer-based teaching packages are so time-consuming, they must be timetabled at times when students are not under pressure, or the "hidden curriculum" will operate adversely to prevent the achievement of objectives. Positive staff attitudes are an essential part of such an environment. The study indicated that a display of staff indifference or hostility towards the computer, even where staff members are not personally involved in computer-related teaching, will lessen the effectiveness of a package. Successful implementation also requires high staff-student ratios, and small group working is usually

indicated, both to provide adequate help and to generate the informal attitude essential for full student participation and the surfacing of all doubts and queries. Pairing on package-based project work and peer group working out of class sessions were also shown to be helpful in achieving package objectives. Adequate documentation is another important factor. If the documentation itself sets out the educational objectives of the package, this enables students to perceive its relevance and makes it more acceptable. Instructions need to be simple and concise, and experience suggested that where standard software was used, only a selected subset of commands and options should be presented in package documentation, to avoid student confusion.

7 PROBLEMS OF COMPUTER-BASED TEACHING PACKAGE USE

Problems associated with the use of computer-based teaching packages are related to the choice of package, the constraints of timetabling, the difficulty of obtaining and updating suitable software, and such implementation problems as the high staff-student ratio required and the costs involved.

Because of the time-consuming nature of the work for both staff and students, the number of packages used must be limited, although many topics within both core and fringe librarianship subjects present opportunities for enhancement in this way. In line with the hypothesis that effectiveness increases as relevance is perceived, it was decided in the research programme under discussion to introduce the packages into the subject areas regarded as most relevant to the greatest number of students-i.e. the "core librarianship studies". The concept of core studies as Management, Indexing and Bibliography is one long held and still officially recognised by the Library Association, although the nature of common core has been subject to endless debate by teachers. The choice of topic within these main subject fields was dictated partly by practical considerations of availability, partly by personal preference, and partly by the syllabus design of the course units peculiar to the institution concerned. These factors will vary in any given place and time, but the principle governing choice can be regarded as constant - namely the value of the contribution the package could make to the subject field at the point of implementation. To overcome timetabling constraints a pattern of implementation was devised which spread the packages over each of the major subject areas in turn, each package building on the computing skills and knowledge of the previous package. This also spread the packages evenly throughout the career of each student cohort, with the object of increasing acceptability by minimising student workload. The resulting method of interweaving packages and units of packages was more difficult to achieve in the two-year professional course than the three-year undergraduate course, and would be more difficult still in a one-year postgraduate course, although a series of end-on units could be designed.

Alleviation of the problems of staff pressure have been touched on above, namely the encouragement of pairing and peer group working by students. Other methods, such as the use of research or advanced students to tutor beginners, and the development of computer-aided instruction for tutorial purposes and of computer-managed learning for assessment have been used by the author and others. Methods of reducing teaching loads in this area need to be explored further, as not only does any teaching involving equipment become time-consuming, but the rapid technological change associated with computing requires constant updating and revision of software and the adaptation of techniques to keep pace with changes in hardware.

Some nineteen programs were tested out and incorporated into the teaching and training packages used in the research programme: twelve were developed inhouse in conjunction with the Brighton Polytechnic Computer Centre staff ab initio or using standard software, while seven were obtained from outside sources, in the main from other British Schools of Librarianship. While desirable in practice, this experience demonstrated the difficulty of producing transferrable software. The use of a "quick and dirty" package to carry out the specific objectives is recommended as preferable to delaying educational benefits in the hope of perfecting packages, which in any event will soon be rendered obsolete by changes in technology or the host computers. Shortcomings in software were shown to be valuable in helping students to understand the nature of computer processes, which tend to be concealed behind smooth functioning programs.

8 ADVANCES IN TECHNOLOGY

The rapid spread of microcomputers in recent years has made computer power available more widely. Small information units are now able to afford computers which can support internal housekeeping needs as well as acting as gateways to external information sources. More librarians and other information workers are thus becoming involved in computer-related activities irrespective of the size of their organisations or the type of work in which they are involved. These developments make it even more important that pre-professional education should provide a satisfactory programme of computer studies for all students.

The nature of the involvement of librarians is also changing. The expanding potential of new storage peripherals, the increase in the use of micro networking, electronic mail, wordprocessing and other facilities, all signal further decentralisation of systems and the transfer of power to the end user. Instead of relying on the expertise of computer experts supporting the large mainframe systems of previous years, staff now need to carry responsibility for the day-to-day running and maintenance of their computer systems, as well as for systems planning and development. Software and management aspects have thus become the prime concern of the information worker, while standard software packages supplied with small computers often need to be adapted within information units to suit the special need of the organisation.

These developments invalidate the earlier stages of Computer Awareness and Computer Appreciation in education for librarianship, and reinforce the conclusions reached in the study described here (that all students of librarianship and information science need sufficient knowledge of computers and computing with the related communication technology, to give them an adequate grasp of the computer processes behind the activities in which librarians now engage.) Looking to the demands of the profession, it is apparent that basic work-orientated skills, informed by adequate understanding of systems design, are needed by staff engaged in such activities as data input and text editing, online database searching, file-handling and manipulation. Extended skills are needed by those responsible for day-to day management of automated systems within libraries; these skills may include programming and systems analysis to enable them to select and modify standard software packages. On all levels librarians need to be able to work with systems analysts and computer technicians and to communicate with them. This requires an understanding of the approach of the computer expert as well as a knowledge of computing terminology. On a managerial level, it requires an informed awareness of

of the range of options available to library systems and an ability to negotiate appropriate software developments. Schools of Librarianship need to respond by providing a sound theoretical education, supported by practical experience for all students. Students with special interests and abilities in the field will require further study to fit them for careers orientated towards automated systems, and pre-professional education can contribute towards [illegible] by the provision of additional optional course units.

It is the author's view that effective teaching requires a full programme of computer studies integrated as far as possible into core and fringe librarianship subjects and supported at every stage by the use of computer-based teaching packages, designed to fulfil the specific objectives of the topic with which they are associated, and fully integrated into the curriculum at the points where they contribute most effectively to the syllabus. With the advent of the home computer and the business computer and the current exponential growth of educational computing in Britain, an increasing amount of software, easily adaptable for library and information science teaching, is becoming available. Thus suitable teaching packages should be more easily developed in the future. Such methods have been shown to contribute to good understanding of and satisfactory competence in the use of computers in library and information work.

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